

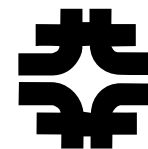
D0 Operations

Linda Stutte

D0 Experiment Dept.

March 17, 2004

D0 Experiment Department



DZero Experiment Department

March 2004

Linda Stutte, Department Head
(Gene Fisk, Deputy Department Head)
Ron Lipton, Deputy Department Head
Marvin Johnson, Associate Head - Run IIb Group
Harry Melanson, Associate Head - Physics Support Group

Run IIb Project

Vivian ODell, Project Manager
(Ron Lipton, Deputy Project Manager)
(Marvin Johnson, Technical Coordinator)
(T.J. Sarlina, Assistant Project Manager)
(Dale Knapp, Budget Officer)

(Gerald Blazey, Co-Spokesperson, NIU)
John Womersley, Co-Spokesperson

Administrative Support

(Terry Erickson)
(Harvey Bruch)
(Sonya Wright)

Physics Support Group

(Harry Melanson, Ldr.)
Sergey Burdin, RA
Richard Cantal
Greg Cisko
Juan Estrada, RA
Herbert Greenlee
Kazunori Hanagaki, WF
Alan Jonckheere
Aurelio Juste, WF
Boaz Klima
Slava Kulik, RA
Yurii Maravin, RA
Martijn Mulders, RA
Ed Podschweit
Makoto Tomoto, RA
Brigitte Vachon, RA
Michael Weber, RA
Markus Wobisch, RA

Run IIb Group

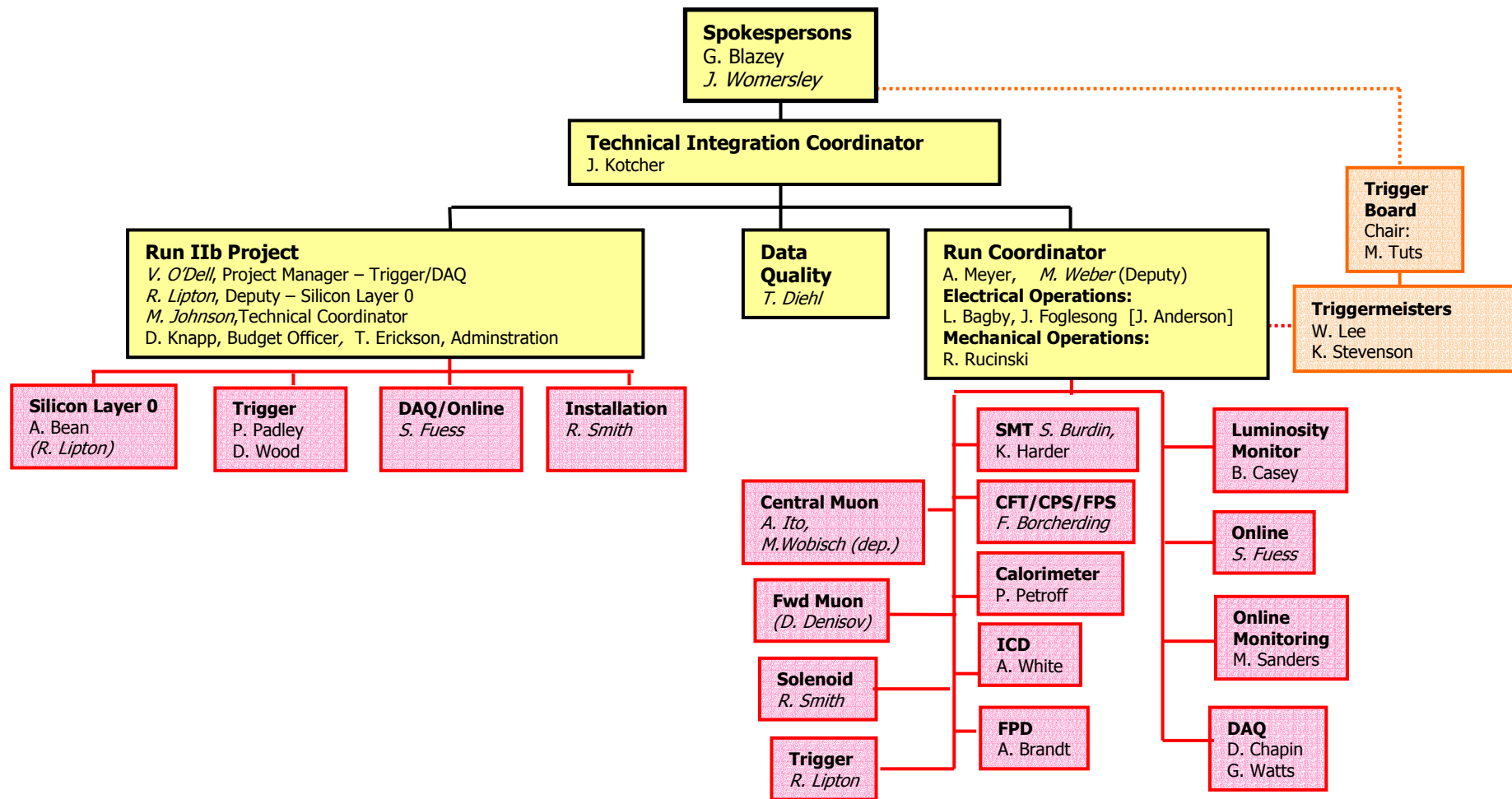
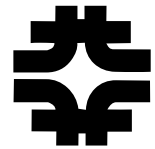
(Marvin Johnson, Ldr.)
Robert Angstadt
Frederick Borcharding
William Cooper
Stefan Gruenendahl
Andrei Nomerotski

Detector Group

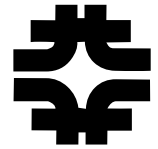
(Ron Lipton, Ldr.)
Alan Bross
Dmitri Denisov
Thomas Diehl
Gaston Gutierrez
Albert Ito
Donald Lincoln
Petros Rapidis
Richard Smith

Stuart Fuess (Online)
J. Frederick Bartlett
James Fitzmaurice
Stanislaw Krzywdzinski
Nobuaki Oshima
Geoffrey Savage
Vladimir Sirotenko
Takahiro Yasuda

Experimental Organization



Electrical Support



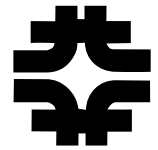
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- 7 Electrical Engineers
 - 2.1 FTE for Operations
 - Electronics, power supplies, management
 - 2.8 Run IIb (Silicon Layer 0, CFT readout boards)
 - 2.1 Else (BTev, MINOS, CMS)
 - 7 Electrical Technicians (6.2 FTE)
 - Power Supplies
 - Protection Systems
 - Air and Water Control
 - Support and Maintenance of Group Designs
 - AC power, Construction Coordinator

Mechanical Support



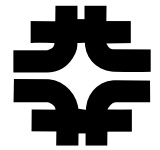
- 2 Mechanical Engineers
 - Cryo systems for solenoid, calorimeter, CFT
 - Silicon cooling system
 - Gas systems for Muon tracking systems
- 1 Operations Specialist
 - Supervises all technicians, operations shifters
- 2 Technical Specialists
 - Building manager; Gas systems, fabrications
- 8 Technicians
 - 4 on shifts
 - Aid for building manager, vacation coverage
 - 2 Loaned out to other PPD, short term projects

Need for Continued Support



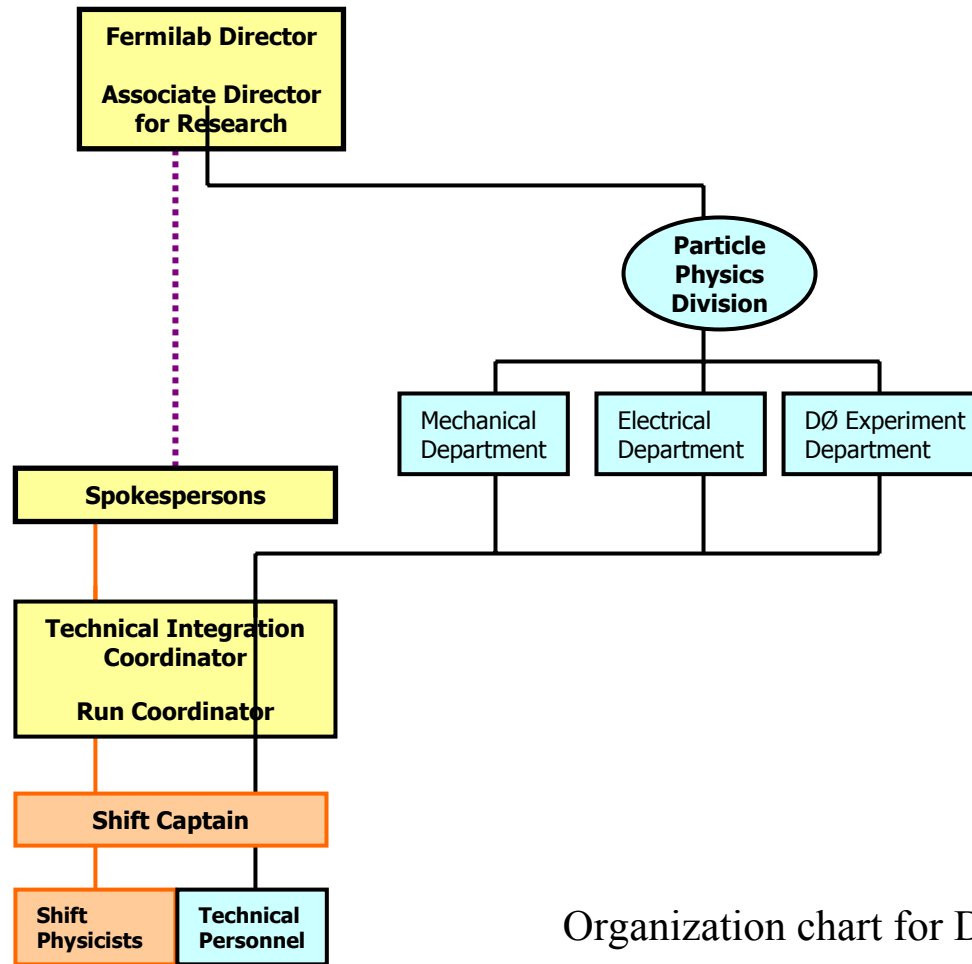
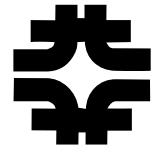
- Steady State Running - Obvious
 - Power supply, electronics support
 - Mechanical support for cryo, cooling and gas
 - Aging infrastructure
- Continued Shift Coverage - Essential
 - Risk abatement
 - Increased efficiency **
- Upgrades ahead – Continued help needed
 - Silicon Layer 0, Trigger and DAQ
 - Increased need for knowledgeable personnel for preparation, installation, debugging
- Discussed weekly with the PPD Division Office

History of Operations Shifts



- Run I – 2 shifters/experiment
- Run II – 1 shifter/experiment
 - Monitor, regulate critical systems such as cryo, gas
 - Ramp magnet power supplies
 - D0, perform other short-term tasks
- Last year PPD management asked us to consider reducing the numbers of hours covered
 - Log kept of incidents which would require call-ins or which might result in decreased efficiency
 - 12.5 call-ins/month, 14 hrs/month beamtime lost
 - Risk of major loss
- Debated over several weeks, ultimately went up to the Director's Office
 - Continue with 1 shifter/experiment coverage

ES&H Responsibilities

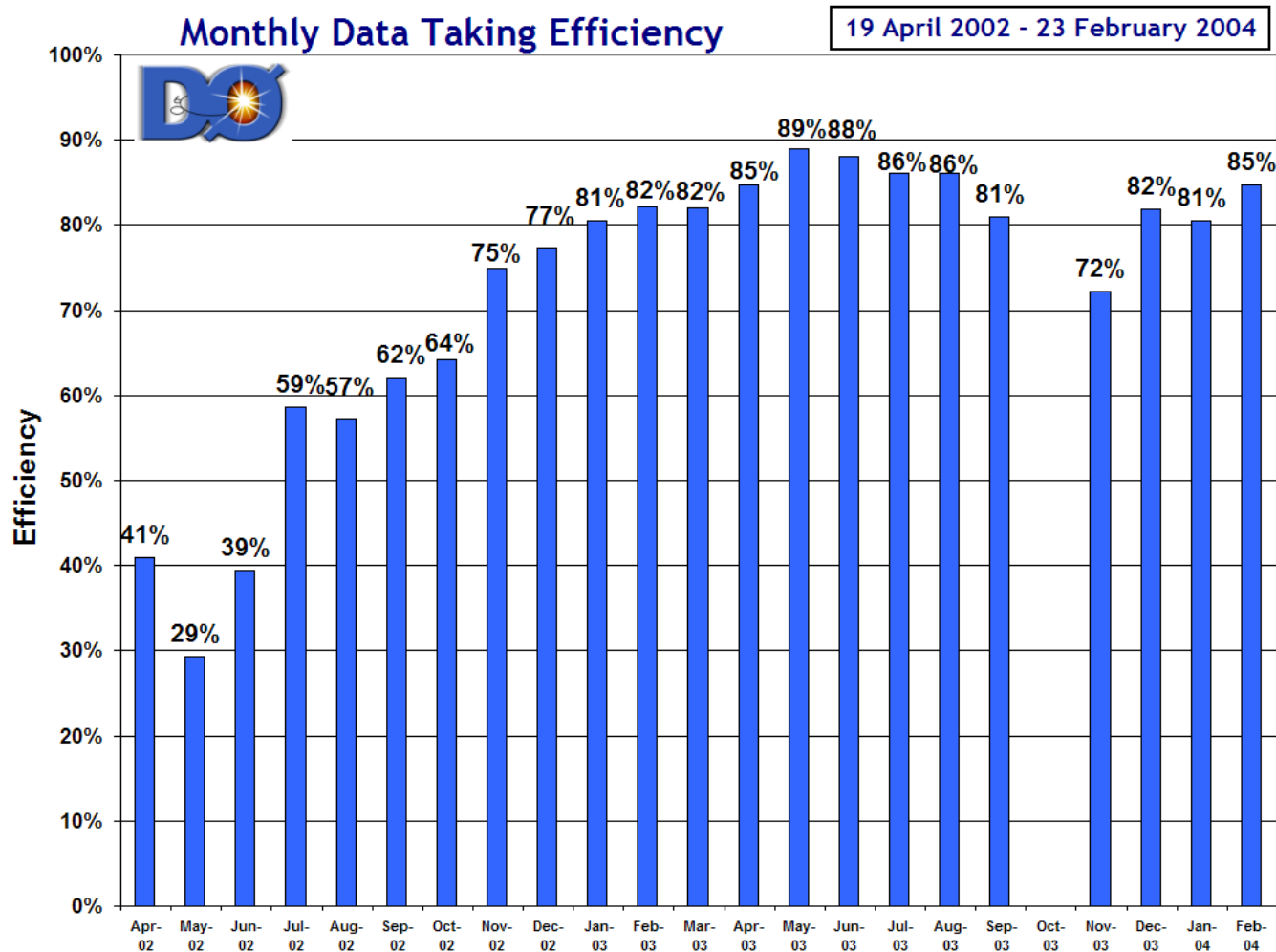


Organization chart for DO operations plan

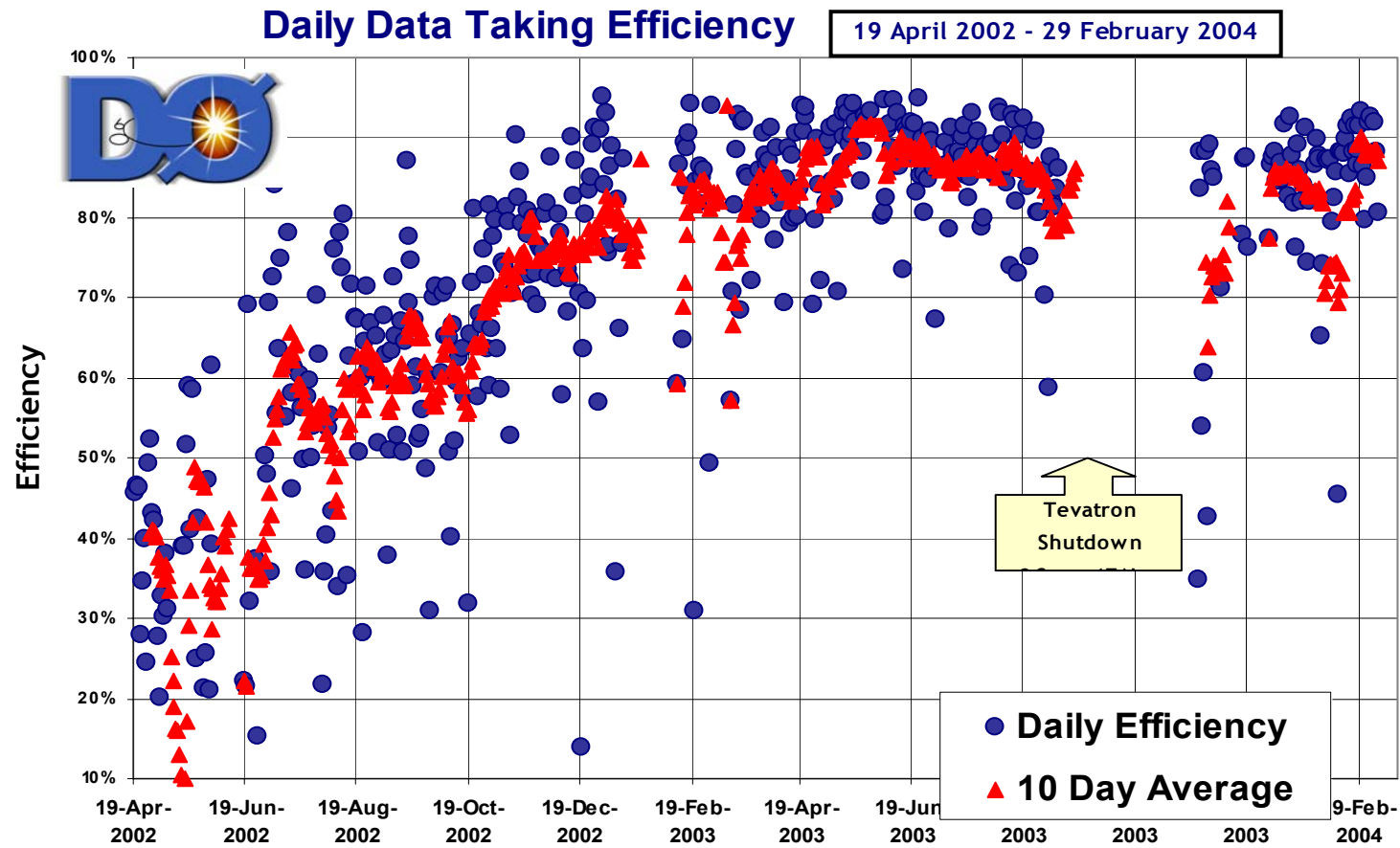
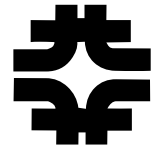
D0 Data Taking Efficiency



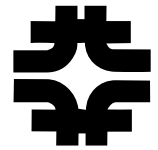
= Lumi utilized during data taking/Lumi delivered



Daily Data Taking Efficiency



Sources of Data Taking Inefficiency



- 4% - Front End Busy
- 2% - Begin/end store; Begin/end runs
- 2% - Silicon trigger commissioning
- 4-8% - Failures
 - Power Supply trips
 - Water drips/trips
 - Broken wires
 - Crate resets due to lost synch
 - Magnet-induced noise, power outages
- Summarized at D0 Operations and All Exptr's

Mitigating Risks



- Radiation damage
 - Non-reversible
 - Sometimes un-predictable
 - Continued monitoring is critical to detect and resolve problems before physics performance is degraded
- Other degradation being monitored
 - Lifetime of components like the silicon readout boards
 - CFT cassette gains due to cryo contamination
- Aging of physical components
 - Task Force to plan purchase of soon-to-be outdated components, investigate whether sufficient spares are available,...
- Experts always on call

Assessing Risks – Radiation Damage



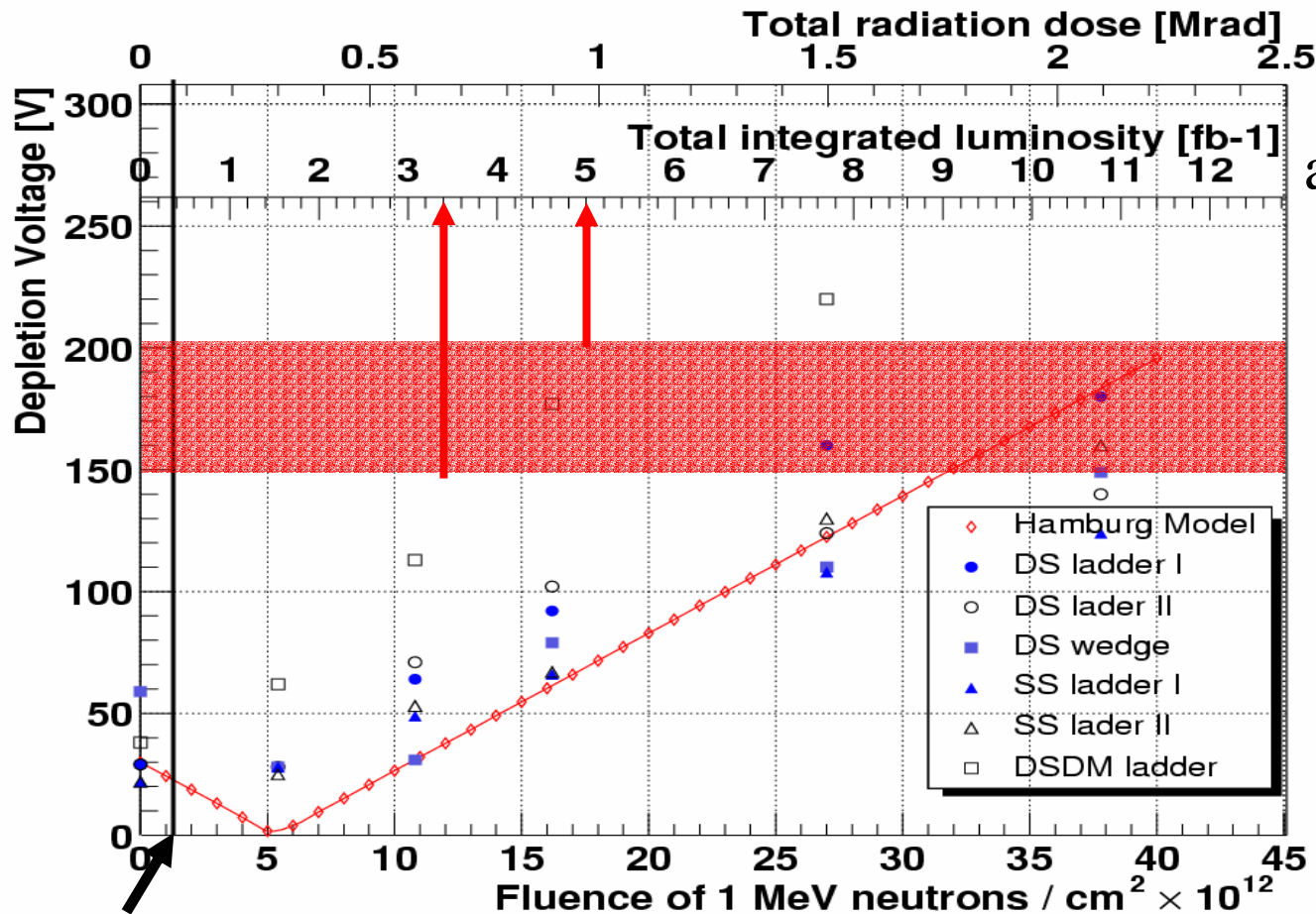
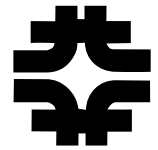
D0 Detectors Radiation Aging Summary

03.03.04.

Detector	Dose, worst location, per fb ⁻¹	Dose when signal reduction expected	Systematic monitoring of aging effects	Radiation aging effects observed	Comments
Luminosity counters	~0.3 Mrad	~0.15 Mrad or 0.5 fb ⁻¹ (10% light reduction)	Not yet	No	Annealing? Scintillator replacement possible
Silicon	~0.2 Mrad	Depletion voltage increase at ~0.4 Mrad or 2 fb ⁻¹	Yes	Leakage currents increase: yes Depletion voltage increase: no	Many studies been done.
Fiber tracker	~15 krad	~15 krad or 1 fb ⁻¹ (10% light reduction)	Started	No	Annealing?
Central preshower	~15krad(?)	~50krad(?)	Not yet	Not monitored	
Forward preshower	~20krad(?)	~50krad(?)	Not yet	Not monitored	
Calorimeter	~1 Mrad	>10 Mrad or 10 fb ⁻¹	Not yet	No	LAr
Muon trigger scintillation counters	~0.5 krad	~20 krad or 40 fb ⁻¹ (~20% light output reduction)	Yes	No	
Forward muon tracker	~2 mC/cm	>2 C/cm or 10 ³ fb ⁻¹	Yes	No	Gas CF ₄ (90%)+CH ₄ (10%)
Central muon tracker	~3 mC/cm	~10% amplitude drop at 0.5 fb ⁻¹	Started	No	Ar(84%)+CH ₄ (8%)+CF ₄ (8%), "cleaning" procedure has been developed

To be added: FPD

Assessing Risks – Silicon Radiation Damage



at 2.7 cm

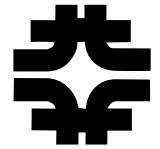
Innermost
layers are
DSDM



3.5fb⁻¹ to 5fb⁻¹

2/20/04

The Budget Process



- Contact Support Personnel, Sub-Detector Leaders and Department Group Leaders for their Needs
- Receive Division Office Guidance for target figures
- Make first pass over the spreadsheet
- Iterate with Support Personnel, Sub-Detector Leaders and Department Group Leaders
- Submit Budget Request

M & S Budget for Operations



DZero Operating						
<u>High Level Summary</u>						
			FY03 Final Plan	FY03 Obligations	FY04 Requests	FY04 Plan
D0 Experiment Operations, Infrastructure			596	594	717.5	609
D0 Run IIA Sub-Detector Operations			798	614	789	676
Scientific Research			339	402	400	290
Management Reserve			65	5	100	50
Total			1798	1615	2007	1625
Expected contributions - Foreign Collaborators					-150	-150
Bottom Line					1857	1475

M & S Budget for Operations



<u>Infrastructure Example</u>		FY03 Final Plan	FY03 Obligations	FY04 Requests	FY04 Plan	Cooper Markup 10/27/03
Cryogenic System		304	344	353	353	308
Cryogenics & Gas				222	222	222
Liq Nitrogen, Dewars 39&42				215	215	215
Cylinders N2, Ar, N2/H2, He				7	7	7
Tube Trailer Certification				0	0	0
Upgrades				49	49	49
Control System Software				10	10	10
Control System Hardware Upgrade				12	12	12
Calorimeter LN2 subcooler				5	5	5
Gas analyzer vent recovery system				2	2	2
New cryo control system UPS				15	15	15
UPS make before break switch & transformer				5	5	5
Maintenance				37	37	37
Air Compressor				5	5	5
Vacuum Pumps				3	3	3
Silicon system chillers				2	2	2
Intellution IGlobalcare extended (IFIX) support				10	10	10
Softshop (PLC software) maint agreement				2	2	2
Uninterruptible Power Supplies (UPS)				3	3	3
ODH Maintenance				2	2	2
I/O Module Repairs				4	4	4
Replace chilled water hoses going to detector				6	6	6
Operations				45	45	0
Overtime for Shift Coverage				45	45	0

M & S Budget for Operations-2



<u>Subdetector Example</u>		FY03 Final Plan	FY03 Obligations	FY04 Requests	FY04 Plan	Cooper Markup 10/27/03
D0 Run IIA Sub-Detector Operations		798	614	789	676	676
Tracking Detectors		137	78	77	72	72
	Silicon Tracker	23	3	28	28	28
	4 HV motherboards, 32 HV pods			24	24	24
	32 25' SHV cables			2	2	2
	General			2	2	2
	Fiber Tracker	29	8	14	9	9
	Helium			5	0	0
	Maintenance test Stands			4	4	4
	Curtains, purge and stores			5	5	5
	Central Preshower	0	0	0	0	0
	Forward Preshower	0	0	0	0	0
	Tracking Electronics	85	68	35	35	35
	VRB spares			15	15	15
	Spare parts for VRBs			0	0	0
	Sequencer parts/maintenance			20	20	20
Calorimetry		44	26	54	45	45
	Calorimeter Electronics	25	24	35	35	35
	Power supplies spares and parts			10	10	10
	Fans and infrastructure			5	5	5
	Monitoring instrumentation			5	5	5
	PC software/maintenance			5	5	5
	Test stand infrastructure rework			5	5	5
	Timing and control card spares			5	5	5
	Intercryostat	19	2	19	10	10
	Replace aging Hamamatsu R647 PMTs			4	2	2
	Replacement Fiber Cables			1	1	1
	Power Supply Repl. (Preamplifier, Pulser)			5	5	5
	Replacement Cables for Fanouts			2	0	0
	Test/Repair/Maintenance Equipment			2	0	0
	Replacement HV Module			5	2	2

M & S Budget for Operations-3



Scientific Research							
			FY03 Final Plan	FY03 Obligations	FY04 Requests	FY04 Plan	Cooper Markup 10/27/03
Scientific Research			339	402	400	290	290
General Operating, Travel			60	123	120	60	60
Office Support			175	135	175	125	125
	Stores Issues/Supplies				175	125	125
Physics Support/Desktop Computing			54	91	55	55	55
	Hardware maintenance				13	13	13
	General computing				14	14	14
	Consumables				18	18	18
	Firewall software				10	10	10
Video Conferencing			50	53	50	50	50
	Video conferencing				50	50	50

D0 Summary



- Experiment-based organization structure
 - Engineering and technician support provided by Electrical and Mechanical departments
- Data taking efficiency used as our performance metric
- Running well with limited resources
 - Continued vigilance required